AFRICAN DEVELOPMENT BANK GROUP

PROJECT: MULTINATIONAL TRANS-SAHARA HIGHWAY PROJECT
COUNTRIES: ALGERIA, NIGER AND CHAD

EXECUTIVE SUMMARY OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

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Summary of the Environmental and Social Impact Assessment

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<th>Project Name</th>
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1. Introduction

This document summarizes the Environmental and Social Impact Assessment (ESIA) carried out as part of the Multinational Trans-Sahara Highway (TSH) project covering three countries: Algeria, Niger and Chad. Each impact assessment covers a separate component of the project. These studies are:

**Niger:** two impact studies and a summarized resettlement plan are available:

- ESIA of the Arlit-Assamaka Road (Algerian Border), June 2013; study approved by the Government of Niger;
- ESIA of the Farié Bridge on River Niger, March 2012; study approved by the Government of Niger;
- Summarized resettlement plan, June 2012; and
- **Chad:** ESIA of the Massakory-Bol-Niger Border road, August 2011 (update of the study conducted in 2005); study approved by the Government of Niger.

The road link running through Algeria will be financed in full by the country.

2. Project Description and Rationale

**Project Objectives:** The project’s sector objective is to contribute to the development of commercial exchanges by road and to the regional integration between the Arab Maghreb Union (AMU), ECOWAS and ECCAS, in general and Algeria, Niger and Chad, in particular. The specific objectives are to: (i) improve the level of TSH service; (ii) reduce the time and cost of transport and logistics on these links: Alger-Niamey, Alger-Ndjamena, Niamey-Ndjamena and Niger-Burkina-Mali with the construction of the Farié Bridge; and (iii) improve the living conditions of the residents of the project impact area. To achieve these objectives, the activities to be carried out are grouped into six categories.

**Description of the corridor:** The Trans-Sahara Highway (TSH) is one of the major integration projects promoted by NEPAD. It directly links six countries belonging to three of the eight Regional Economic Communities (RECs) of the African Union, namely: Algeria and Tunisia (AMU), Mali, Niger and Nigeria (ECOWAS) and Chad (ECCAS).

With the addition of the Farié Bridge, the project also provides easy access to Burkina Faso and Mali. The direct project impact area comprises the 32 regions crossed, the 74 built-up areas served, an area of 4.4 million km² and a population 60 million people (in addition to Burkina Faso). The TSH has a total length of 9 022 linear kilometres, of which 7 771 km (80%) have
already been asphalted, and 1 851 kilometres of dirt roads (20%). It comprises the 4 498 km-long main road (which included 223 km of unpaved road in Niger), running from Algiers (Algeria) to Lagos (Nigeria), via Zinder (Niger), and three secondary roads branching from this major road:

- The Tunisian section, which runs from Ghardaia (Algeria) to Gabès (Tunisia). This link is 866 km long and fully asphalted;
- The Malian branch running from Bamako (Mali) to Tit (Algeria); it is 2 461 km long and comprises 1 321 km of asphalted roads and 1 140 km of feeder roads; and
- The Chadian section, which links Ndjamen (Chad) and Zinder (Niger); it is 1 197 km long and comprises 724 km of asphalted roads and 473 km of feeder roads (of which 415 km in Niger and 57 km in Chad currently being asphalted). It is worth noting that in Chad, the construction of the 85 km-long Massakory-Ngouri section will be entirely financed by the Islamic Development Bank (IDB). The procurement procedure relating to these works is underway and the works should soon begin.

The construction of the Arlit-Assamakka section in Niger and the section linking Ngouri-Bol-Niger border to Chad is therefore of regional importance as it aims to fill in the missing links on major axes of the TSH and its Chadian branch. Moreover, these roads are located on the trans-African corridors running from Algiers to Lagos (ATT 2) and Dakar to Djibouti (ATT 5 and 6), which were identified as priority links by the Programme for Infrastructure Development in Africa (PIDA), of which AfDB is the executing agency and whose priority action plan was endorsed by the African Heads of State Meeting of January 2012.

Alongside the construction of road infrastructure, it will be necessary to put in place measures for facilitating trade and transit at the two borders, with a view to achieving the regional integration objectives sought by the infrastructure investment. Consequently, the project is highly inclusive since it would contribute to the opening up of Chad and Niger in the north and the south, and the economic integration of the three regions (North, West and Centre).

**Project Description:** The project focuses essentially on the construction and asphalting of road sections constituting the missing links of the main axis and the Chadian section of the TSH, of a total length of 565 km, construction of a 543 metre-long bridge on River Niger at Farié, with 3 km of access roads, and the establishment of measures to ease transport and transit at the Algeria-Niger and Niger-Chad border.

**2.1. The Assamaka-Arlit Road Section in Niger**

The Arlit-Assamakka-Algerian Border section is at the heart of the crucial economic, social and political stakes for Nigeria, Niger and Algeria and, beyond these countries, for the region and the continent. Its construction is faced with multiple constraints related to the security situation in the area and nomadism of the local population. This situation is a hindrance to improved commercial exchanges and enhanced integration. However, the growth and diversification of these exchanges require constant support from the States individually and collectively in their bilateral and multilateral relations.
At national level, the construction of this road infrastructure derives its legitimacy from the economic stimulus programme that is manifest in the preparation of three (3) main strategic documents: the “Sustainable Development and Inclusive Growth Strategy” (SDDCI NIGER 2035), the Socio-Economic Development Plan (SEDP 2012-2015) and Interim Framework Programme of Government Action (IGAC 2011-2012).

The work to be carried out concerns mainly the construction and asphalting of the Arlit-Assamaka-Algerian Border 225 km-long road, including the 2-km connecting road leading to Arlit city centre. The roadway is 7.0 m wide, with a 2 x 1.50 m shoulder, or a 10-metre roadbed. The total right-of-way is 12 metres wide on each side of the centreline of the road, which adds up to a total surface area of 5 400 000 m².

2.2. Farié Bridge on River Niger

As part of implementation of its transport sector policy, the Government of Niger has decided to prioritize the rehabilitation and improvement of existing infrastructure, and the building of new communication lines. Part of the traffic between the WAEMU countries (especially eastern Mali, northern Burkina Faso and western Niger) makes use of the Ouagadougou-Kaya-Dori-Téra-Niamey-Farié road, which is part of the WAEMU countries Community Action Programme for Infrastructure and Road Transport (PACITR).

Currently, the Ouagadougou-Kaya-Dori-Téra-Niamey-Farié road is fully asphalted and the Bank has contributed to the financing of this link, particularly the Dori-Téra section. A significant increase in traffic is expected, with a large portion of the flow of the heavy duty traffic heading towards eastern Mali and western Niger, as well as towards the Niger River valley from Atlantic Ocean ports (Lomé, Accra, Tema and Abidjan). The major obstacle is the River Niger on which there is no bridge. At Farié, the two banks of River Niger are now connected by a ferry with a capacity that does not exceed 12 passenger car units (pcu) and operating only 12 hours a day, from 6.30 a.m. to 8.30 p.m., with a two-hour break from 12 noon to 2.40 p.m. This results in wasted time and increased transport overheads. To enable users to save time and ease the flow of the expected heavy traffic, WAEMU has funded detailed technical studies on the economic feasibility and environmental and social impact of a bridge on River Niger at Farié, with a view to enabling the country to seek financing.

Therefore, the project has an integration dimension at both the national and international/regional level. Hence, its programming in WAEMU’s Community Action Programme for Infrastructure and Road Transport (PACITIR), which aims to develop and strengthen road infrastructure that promote regional integration.

The river banks at the proposed crossing point, close to the existing ferry, will be connected by a bridge approximately 630 metres long. The access road to the bridge runs from the RN1 junction and the existing roadway leading to the ferry, and ends on RN4 under construction. The total project length is 3.5 km. This development also includes two roundabouts at the start and end of the project connecting the various road sections.
2.3. The Ngouri-Bol-Daboua-Niger Border Road Section (330 km)

The Massakory-Bol-Niger Border 415 km-long road has an extremely varied route, which starts from Massakory to the southeast of Lake Chad, bypasses the western shore of the Lake to Bol to the north of the Lake before climbing towards Niger via Liwa, Rig Rig and Foyo. From the Massakory Sahelian area, it runs through a semi-desert region characterized by sand dunes and winds its way between polders (basins that are flooded in the rainy season, but drained and arable in the dry season) before reaching northern Bol and then the desert region of Baga Sola.

Work on the Massakory-N'Gouri-Bol-Baga Sola sections of this road actually began in 1988 (it is commonly referred to as Italian Road). Since the road runs through sandy soil, it was backfilled (with a mixture of sand and clay), but remained susceptible to erosion and water due to formation of quagmires in the rainy season.

Light maintenance was carried out 10 years later on the Massakory-Bol link because of the major canal construction works going on in the region. The Bol-Niger Border section, which has remained unchanged for 17 years, needs to be reconstructed. Speed on this section is 20 to 25 km/h, scarcely up to the average speed limit. The link has suffered significant deterioration and is very frequently interrupted by erosion due to runoff. After the Baga Sola intersection and between this intersection, Liwa, Rig Rig, Foyo and the Niger Border, the road runs through a desert area.

3. Political, Legal and Administrative Framework

3.1. In Niger

At the national level, Niger has a plethora of legal and statutory instruments on environmental protection, but the major ones referred to in this study are those that have direct or indirect links with the project.

At the institutional level, Sections 13 and 8 of Framework Law No. 98-56 on environmental management stipulates that the Ministry of Environment shall be responsible for implementing the national environmental policy, in cooperation with the other ministries and agencies concerned, and shall liaise with them in ensuring the inclusion of environmental considerations in all development plans, programmes and projects. It shall be assisted in its task of preparing, implementing and monitoring environmental policies by a national consultative body whose powers and organization shall be defined by decree.

“The Environmental Impact Assessment Office shall be set up, comprising the various specialists required for the effective evaluation of the report on the impact assessment and consequences of a project on all aspects of the environment”.

In accordance with the above provisions and other legal instruments regulating the exploitation and development of natural resources and environmental management in general, the following are the key supporting institutions: The Ministry of Water Resources and Environment, the Ministry of Public Works, the Ministry of Transport and Civil Aviation, the Ministry of Urban Development and Housing, the National Environmental Council for Sustainable Development (CNEDD), the National Public Transport Users' Council (CNU), the Ministry of Public Health, the Niger Public Works Agency (NIGETIP), the Government and local communities and members of civil society (haulers, road transport unions, NGOs and Associations).
3.2. **In Chad**

Law No. 14/PR/98 enacted on 17 August 1998 relates to environmental protection. Its purpose is to define general environmental protection principles on the basis of which the environment is sustainably managed and protected against all forms of degradation in order to safeguard and enhance natural resources. These principles also aim at improving the living conditions of the population.

Law No. 14/PR/2008 relating to the legal framework of forests, wildlife and fisheries resources: enacted in 2008, this law lays down provisions on the conservation and sustainable management of forests, wildlife and fisheries resources.

Decree No. 904/PR/PM/MERH/2009 of 6 August 2009 regulating pollution and environment nuisance: enacted in August 2009, the decree, among others: (i) defines environmental pollution and nuisance; (ii) establishes a national technical committee responsible for monitoring and evaluating measures adopted to enforce international pollution and nuisance instruments, a unit in charge of coordinating pollution- and nuisance-related activities, and a technical control unit charged with safeguarding the environment against all forms of pollution and nuisance; and (iii) defines facilities set aside for environmental protection (ICPE); classifies these facilities into two categories depending on the severity of the hazard or nuisance that their operation may entail. These ICPEs are subject to either an authorization or a simple declaration. Those subject to an authorization include centres for the sorting and storage of household and industrial waste, as well as waste from construction and public works; (iv) laying down financial provisions for the management of ICPEs, the tax rates and fees of which should be set by the finance law; and (v) defining auditory and olfactory nuisance, its sources, the permitted exposure limits, its management, means of control, surveillance and penalties.

Therefore, this decree will apply in full to construction companies, particularly as concerns the management of their waste, auditory and olfactory nuisance, especially in their camp, garage, workshop and sites for the accommodation of their non-specialized staff.

Decree No. 630/PR/PM/MERH/2010 of 4 August 2010 relating to the regulation of environmental impact assessment: enacted on 4 August 2010, the decree lays down the modalities for implementing the environmental impact assessment process. It requires that the prior approval of the Minister of Environment be sought for developments, structures and any other works that could have significant consequences and impacts, as well as harmful effects, on the biophysical and human environment, notably in highly sensitive areas such as forests, arid or semi-arid areas prone to desertification, oases, wetlands, etc. It classifies projects into three categories: (1) Category A: projects that could have diverse and significant environmental impacts, requiring thorough investigation. These projects are subject to the conduct of an environmental impact assessment; (2) Category B: projects that could have easily identifiable and limited environmental impact for which the mitigation measures are generally known. These projects are subject to the production of an environmental impact statement (EIS); and (3) Category C: projects with no significant impact on the environment, for which no EIS or environmental impact assessment (EIA) is required.

In addition, this decree (i) establishes within the Ministry of Environment an entity responsible for environmental impact assessment and defines its tasks; (ii) defines the modalities for the conduct and the contents of the environmental impact assessment; (iii) provides for the conduct of public consultation by the Ministry of Environment based on the assessment report and for a
period of 45 days at the headquarters of the administrative units and the office of decentralized communities concerned, for the purpose of hearing the views of local residents, other national, regional and local institutions and agencies concerned by the facility; and (iv) determines the penalties.

Based on the decree, this road project may be classified as Category A under Chad’s categorization system.

4. Description of the Project Environment

4.1. The Arlit-Assamaka Road Section in Niger

**Water resources:** In the study area, rainfall is extremely low. When it does rain, the water quickly seeps into the ground or evaporates due to the high temperatures, especially at this time of year. Water resources consist essentially of groundwater aquifers. The project area is characterized by two aquifers, namely the freshwater primary and permian-jurassic aquifers found in the formations of the western edge of Air. These aquifers are of economic interest, but currently they are still little known. Hydraulic structures on the route of the road are the drinking water supplies of the cities of Arlit and Akokan, and the Assamaka artesian borehole.

**Vegetation:** In this region, the vegetation - when it does exist - is a discontinuous steppe localized in depressions and on some sandy soils. It may be characterized by the almost total absence of trees and shrubs, by widely spaced perennial trees with great capacity to adapt to drought and by the remarkable transience of the annual species which appear and disappear as the random rains come and go.

The woody vegetation along the track of the Assamaka-Arlit road, is composed of a few acacia plants of between 1.5 and 2 m tall, found mostly on river beds. The herbaceous vegetation is also restricted to the depressions. It consists of *Panicum turgidum*, which are highly dispersed plants growing in clumps. On the sand mass may be found here and there *Cucurbitaceae* (the wild bitter variety of genus *Citrullus*) and *Chrozophora brachiana*. On the banks of fossil valleys, the presence of vegetation has led to the settlement of cattle herders as evidenced by the presence of their animals or traces of past settlements.

**Wildlife:** In Niger, there are three major habitats: the desert, the Sahel and the Sudan enclave of the southwest. The project area is concerned with the first, which is characterized by large variations in temperature, excessive dryness and intense sunshine. Wildlife survives only thanks to excellent thermal control, highly developed water-saving ability resulting in dry droppings and concentrated urine and homochromy (colour similarity or blending of animals with the surrounding environment). The main herbivores of the Niger desert are the addax antelope called “desert pilgrim” because of its constant mobility and is found mostly in Ténéré, the Dorcas gazelle, the ruffifron and the dama (in the south), and the heavy-bodied Barbary sheep of the mountainous regions of Aïr and Djado. The area is also home to wild cats and fennecs. The bird population includes ostriches, great bustards, vultures and larks. Reptiles are represented by skinks, agamas, geckos, the dreaded horned viper and the harmless javelin sand boa.
The area concerned by the road construction is less humid than the southern part of the desert, and receives between 250 and 100 mm of rain annually. Like Aïr and Djado, it has no major landforms. However, the presence of large herbivores may be observed because of the lush vegetation attributable to adequate rainfall and the great migration ability of these animals.

A COMINAK environmental assessment report states that the region is a transit area for migratory birds, many of which make a stopover at the SOMAIR and COMINAK water points, the drainage basins and lagoons. These basins, forming a habitat for the thriving of reeds and shrubs (mainly *Prosopis jujiflora*), constitute welcome pockets of freshness for transiting migratory birds. The birdlife of the area comprises the following main species: ash-coloured herons, black-headed herons, swans (*tantalum ibis*), sacred ibises, moorhens and the common amaranth. Passerines (ravens) are commonly found in this area (within the vicinity of homes) as are chicken-like birds (sand partridge).

According to the 2012 General Population and Housing Census, Arlit Division has a population of 103,000 inhabitants, 83,000 of whom reside in Arlit urban centre, representing an average density of 0.7 inhabitants per km².

The cities of Arlit and Akokan have experienced considerable population growth due to the uranium exploitation. This situation has led to significant mixing of people from several regions of Niger and neighbouring countries. Both cities are also a transition zone for migrants bound for North Africa. All these factors have increased the STDs/HIV/AIDS prevalence rate to 1.32%, compared with the 1.01% national average (NHIS quoted by COMINAK Centralization Report 2003).

The economic structure of the Agadez region, like that of the country, is also characterized by a predominance of the primary sector (agriculture and livestock). Thus, the main sources of income for households in the Agadez region continue to be, in order of importance, livestock production (46.2%), informal activities outside the agro-pastoral sector (39.65%) and agricultural production (4.4%) dominated by market gardening.

### 4.2. Farié Bridge on River Niger

The bridge is located at Bagoumé, a hamlet in Farié village, itself located in Kourtheye rural commune in Tillabéri region. Its direct impact area spans 7,210 km² and straddles the Kourtheye rural communes of Namaro, Dargol and Karma. It covers the south-eastern part of Téra Division, the southern part of Tillabéri Division, and the north and north-western parts of Kollo Division.

Overall, the Tillabéri region has a Sahelian climate to the north and the Sahelo-Sudanese climate to south, with rainfall of between 100 mm isohyets in the north and 800 mm isohyets in the south. The soils are generally poor, with very low-to-medium fertility. Water resources consist of surface water and groundwater. The drainage system of the study area consists mainly of the Niger River - the only permanent water that crosses the four communes concerned - its two tributaries and several Koris and pools, all of which are faced with the problem of silting, which has drastically reduced their potential over the years.

The forest formations are characterized by three topo-sequential levels, namely Plateaux, Watersheds and Floodplains.
The wildlife includes: (i) mammals comprising such species as hippopotamus, manatee, otters; and (ii) water birds. In the wooded areas of rivers Dargol and Sirba, the presence of gazelles, warthogs and monkeys (baboons and patas) may also be noted.

Regarding the human environment, the results of the survey showed that the economy of the area is mainly based on subsistence farming and livestock. As for trade, fishing and handicrafts, they are practised as a secondary occupation by the residents of the project area. The area also has a sizeable socioeconomic infrastructure (health, education, markets, etc.). In the project area, women are subject to many constraints, including the burden of house chores, illiteracy due to lack of training centres, extremely limited access to basic social services (health, education, etc.), early marriage, food insecurity, etc.

The major diseases present in the area are malaria, pulmonary diseases (cough/cold and pneumonia), diarrheal and infectious diseases. The most common waterborne diseases are diarrheal diseases, intestinal worms, dysentery, cholera and bilharziasis.

4.3. **The Ngouri-Bol-Daboua-Niger Border Road Section (331 km)**

The road skirts the western shore of the lake and runs up to the northern Bol before heading towards Niger via Liwa, Rig Rig and Foyo. It crosses a semi-desert region dotted with sand dunes and meanders through polders (basins flooded in the rainy season, drained and arable in the dry season) before reaching northern Bol and then Baga Sola, a desert region.

Work on this section actually began in 1988 (it is commonly referred to as *Italian Road*). Since the road runs through sandy soil, it was backfilled (with a mixture of sand and clay), but remains susceptible to erosion and water due to formation of quagmires in the rainy season.

The project’s direct impact area covers a 50 metre-strip on either side of the roadway, that is, a 110 metre-wide corridor. Twenty-four (24) villages are within the project’s direct impact area, 14 of which are located along the route of the Ngouri-Bol section, six villages along the Bol-Bagassola-Liwa link and four along route of Liwa-Rig and Rig-Foyo sections.

The study area is relatively flat. The formations crossed are of the recent Quaternary consisting of alternations of sand and sandy clay due to the fluctuating levels of Lake Chad. Soils in the assessment area are crude and little evolved mineral, desert and semi-desert soils with very low agricultural potential.

The area is characterized by two watercourses: Lake Chad and Bhar El Ghezal. Lake Chad is closely linked to rainfall, evaporation and human diversions. The lake is highly dependent on seasonal water flows. Currently, its average depth ranges from 1.5 to 5 m.

Bhar El Ghezal is an intermittent river, flowing only for a few months during the rainy season to empty itself into Lake Chad.

The lower Pliocene (found at depths of between 150 and 400 m) comprises the most significant aquifers of the Lake Chad Basin.
The vegetation depends on the soil type: the pseudo-steppe vegetation on isohumic soil, water courses, river soil vegetation (*Acacia radiana*, *Capparis decidua*) and *Cynodon dactylon*, *Sporobolus robustus*, around barren areas.

The project area is home to the thorny steppe. The vegetation observed along the route is sparse, composed predominantly of *Leptadenia pyrotechnica* except in the cities of Bol, Baga-Sola and along the wadis where *Borassus aethiopum*, *Salvadora persica* and date palms may be seen.

In the study corridor, there is small wildlife such as jackals, gazelles, hyenas, and reptiles. However, the area is rich in birdlife due to the presence of Lake Chad, which regularly supports large concentrations of transcontinental migratory birds. The road runs through two regions: the Lake (Bol and Baga-Sola Sub-Prefectures) and the Kanem region (Rig-Rig Sub-Prefecture). The population is predominantly rural, and is characterized by the mobility of its youth. The enrolment rate for girls is very low, at only 13-37%.

Up to 82% of the working population is employed in agriculture (millet and maize) and livestock, followed by trade. The cereal produced in the lake region is exported to Niger and Nigeria. Other crops are grown in the area (beans, potatoes, groundnuts, etc.), mainly in Doum-Doum, Bol and Ngouri. However, acute malnutrition prevails in the region, and stands at 23% in the lake region (15% is the emergency threshold).

The project area is a livestock area *par excellence*. The pasture coverage varies depending on the season and rainfall. Half of the livestock (40% goats and 34% cattle) migrate from the project area during the dry season.

The main products traded are fish, soda (precipitation of bicarbonate and sodium bicarbonate), spirulina, etc.

Fishing is a less important activity in the region compared to agriculture and livestock. Large quantities of fish are sold in N'Djamena.

Handicraft is very little developed (weaving of mats and pottery).

In the project area, women account for 50% of the population. Despite the national and international instruments adopted by Chad for the protection and promotion of women, they remain subject to cultural constraints (early or forced marriages, low enrolment of girls, female genital mutilation, polygamy, female household heads (high men mobility). Women own 25% of cattle and control the manufacture of butter.
5. Project Alternatives Considered

5.1. The Arlit-Assamaka Road Section in Niger

“No project” option: The “no project” alternative consists in leaving the area in its current state, that is to say, without asphalting. Leaving the area in these conditions is not a viable option, especially as the desired objective, namely completion of the Algiers-Lagos Corridor, has not been achieved. Thus, the development of economic and social exchanges between the regions, the provision of access for whole population, regional and national economic integration, consolidation of national unity and the establishment of the security of people and property will not be achieved. Such a state would aggravate the landlocked nature of Niger and especially hamper the population’s access to basic social infrastructure.

Project option: Cities and built-up areas along the Algiers-Lagos Corridor will be opened up by being provided with an all-season sustainable and viable road, which facilitates the marketing of agro-pastoral and manufactured products, access to basic social infrastructure and regional integration - all of which are the main expectations of the countries involved in the Trans-Sahara Highway Construction Project.

The “project” alternative consists in implementing the project activities for the construction of Arlit-Assamaka-Algerian Border road segment, forming the yet-to-be asphalted portion of the Trans-Sahara Highway. At the national level, this project contributes to the achievement of the Government’s objectives of improving the living conditions of the population as defined in ESDP 2012-2015 and in the “3N” (Nigeriens Feed Nigeriens Initiative). These works cannot, however, be carried out without generating positive and negative impacts that will affect the biophysical and human environment of the project impact area.

The positive impacts will be in line with the objectives of developing the country’s infrastructure, in general, and that of the sub-region, in particular.

5.2. Farié Bridge on River Niger

There are two possible alternatives: the “project” and the “no project” situations. The “no project” situation is tantamount to leaving the section in its current state and continuing to use the ferry as the only means of crossing with the inconvenience that that entails for users and local residents. The “no project” option refers to the possibility that the Farié Bridge will not be built and that the river will continue to be crossed by ferry, with the adverse social and environmental impact that option implies. While this option has also led to the emergence of informal trade activities at vehicle boarding sites, the truth remains that it is at variance with the policy of the Niger Government and the country’s economic and social development objectives as well as with WAEMU’s policy. Concerning the “project” scenario, some negative impacts characterizing the “no project” option may still be expected, but the long-term positive effects far outweigh the negative impacts which, in any case, will be mitigated.
5.3. The Ngouri-Bol-Daboua-Niger Border Road Section (330 km)

“No project” option: The "no project” option implies that the Massakory-Ngouri-Bol-Baga Sola-Rig Rig-Niger Border stretch and the related feeder roads will be left in a poor state with dire health, social, economic and environmental consequences and complete lack of development prospects for the project impact area.

"Project" option: Conversely, the "project" option is the necessary alternative because the road section concerned by this study is part of a whole project called the “Trans-Sahara Highway” and serves several countries within the framework of trade, at the same time offering the country an additional means of contact with West African and even North African states. The positive impacts are many, including: (i) improvement of the living standards of local residents; (ii) employment for local residents and especially the local youth; (iii) ease of access to health centres; (iv) increased demand for food services, beverages, food and manufactured consumer products, housing and transport in the project area; (v) uninterrupted supply merchants and transportation of agricultural and industrial products to the consumption points; (vi) increased production and marketing of agricultural products and handicrafts, driven by demand, etc.). Overall, the project will contribute to reducing poverty and improving the environment and living conditions of the population.

6. Potential Impacts and Mitigation/Enhancement Measures

6.1. The Assamaka-Arlit Road Section in Niger

Positive socioeconomic impacts: The Trans-Sahara Highway is a project of national import, which will help to open up Niger. For the residents of Arlit Division, the project will promote socioeconomic development by creating opportunities in terms of the marketing of agro-pastoral products, ease of transportation of goods between the port of Algiers and the northern part of the country, the comfort of travelling and medical evacuation.

Harvesting of building materials and water: Road infrastructure building requires good quality construction materials. This situation always compels enterprises to:

- Use high quality natural materials, including lateritic gravel, requiring the opening of borrow sites close to the project area, very often on both sides of the route;
- Set up a crushing plant, offices and mechanical repairs workshop in an optimal zone sufficiently far from low-lying areas;
- Drill deep wells to meet the site’s water needs and hand over the wells to local residents on works completion.

Installation of the workers’ camp: The installation of workers’ camp should be subject to strict control to ensure that it does not inflict profound and irreversible damage on the environment. Measures will be proposed and provisions adopted to prevent the camp’s impact on the natural and human environment.
**Assumption and risk:** The achievement of project objective is predicated on the assumption that the security, economic and social environment will remain conducive to the country’s development and the pursuit of the ESMP objectives.

This project component does not entail any displacement or loss of property by the population, considering its isolation and the fact that it is located in a desert area completely free of residents and economic activities. The only points where the road approaches communities are at its two ends, more specifically at Assamaka Arlit where skirting around the built-up areas is an option.

Mitigation measures are proposed to cushion the negative impacts of the project and maximize the positive impacts. They are primarily preventive, reducing or offsetting the negative impacts of the project.

**General impact mitigation measures:** The general mitigation measures apply to all actions carried out as part of the project implementation. They are intended to reduce the environmental nuisance associated with the site and should be included in the terms of reference of the enterprise awarded the project contract. These measures include:

- The interruption of road traffic during the construction period should be avoided;
- Recruitment of casual labour, notably workers for the project needs: residents of the area crossed by the project should be given preference;
- The collection of water for the worksite should never jeopardize the water supply of the local residents. If necessary, new water supply sites should be sought and made available to the population on closure of the site. This applies especially to Amidar (workers’ camp) and Assamaka villages;
- Signs that are visible both day and night will be put up notifying road users of the site, especially in residential sections;
- The ground should be watered at the crossings of built-up areas and at borrow sites to avoid excessive dust emissions;
- Appropriate safety measures must be adopted on the site to protect workers;
- Development of an emergency response plan for implementation in the event of worksite accidents, particularly the spill of hazardous substances;
- The size and design of the machinery should be suitable for the nature of works and equipped with back-up beepers. Where possible, contact pressure machinery should be used. Very noisy machinery should be soundproofed as much as possible, especially in residential areas, such as Arlit and Assamaka;
- All solid and liquid waste generated by the project, including packaging and food waste, should be collected and conveyed to a dump. In particular, waste oil should be carefully collected in sealed containers and deposited in places where they do not threaten the environment, and under no circumstances should they discharged into side ditches;
• Depressions and cracks may be used for the disposal of waste, subject to prior authorization by Arlit environmental services; and

• Construction machinery and vehicles should, as much as possible, use existing tracks to access the works site and avoid getting too close to residential areas in Arlit and Assamaka.

**The population’s health and well-being:** Concerning the risks of transmission of STDs/HIV/AIDS from the workers and staff of the work site to the local population or vice-versa, awareness campaign should be carried out right from the workers recruitment phase and throughout the construction period.

The awareness campaign will be conducted by the environmental control officer, in collaboration with local NGOs and associations involved in combating STIs/HIV/AIDS, as well as Arlit health services.

Regarding the dumping of hazardous substances, the environmental control officer must ascertain that these substances are stored in appropriate locations and that the terms of reference of the enterprise awarded the contract include measures for ensuring a rapid response in the event of an accident.

To mitigate the negative impact of the works on the health and safety of the construction workers and persons and property, the following measures will be implemented:

• Involve the security and national defence forces in the implementation of the security arrangements for the road construction site;

• Ensure that construction site workers undergo medical examination to determine their health situation before works;

• Provide the site workers with individual protective gear (dust masks and smoke masks, gloves, boots, helmets, etc.) and ensure that they are put on;

• Provide all worksites opened with first aid boxes for use, if need be;

• Put in place a satellite phone service available 24/7, under the responsibility of the works foreman, so that the nearest Regional Hospital Centre may be reached in the event of an emergency;

• The contractor will ensure that work starts at 6 a.m. and stops at 6 p.m. to reduce the impact of noise, and ensure that safety measures are adhered to;

• Put up temporary traffic markers and signboards at the road sections under construction;

• Provide site workers with appropriate protective and safety gear, and ensure that it is put on;

• Traffic signs indicating the exit of site machinery and trucks, and the speed limit at the crossing of built-up areas and intersections with the existing tracks must be put up by the road construction company;
• Establishment of a health and work safety services by the enterprise awarded the contract;

• Organize awareness sessions for residents of surrounding villages on the prevention of sexually transmitted infections (STIs), such as HIV/AIDS (backed up by the free distribution of the means of prevention), tuberculosis and diarrheal diseases;

• Anti-STI/ HIV/AIDS billboards should be placed at the entrance on both sides of the road at the city of Arlit and of Assamaka village.

6.2. **Farié Bridge on River Niger**

The implementation of the proposed construction of the bridge on River Niger is consistent with the development objectives promoted by the Niger Government through various strategy papers and programmes.

Moreover, during its construction and operation, the bridge will generate obvious positive impacts that will benefit the population directly concerned and the country in general. It will boost sub-regional integration by promoting trade. The expected positive economic, social and security impacts are significant. The project will also have a negative impact on aspects of the biophysical and human environment that have been highlighted by this study. The earthworks relating to the construction works will have minor effect on the plant cover. Ferry staff affected by the decline in their activity will be redeployed.

The proposed construction of a bridge on River Niger at Farié includes a set of activities that will generate impacts during the construction works and throughout its operational phase. The biophysical and human environmental components that may be impacted during the two phases of the project are air quality, water, sediment regime, soil and geomorphological resources, flora and fauna, employment, health and safety of people and workers, agricultural activities and other income generating activities.

**Analysis of preparation-related impacts:**

The preparatory phase is important for the installation of the site bases, manufacturing areas, base camp, the mobilization of machinery and mobile equipment, etc. The initial physical damage to the physical, biological and human environment will be recorded at this phase and will be followed by that of the construction phase.

The main impact-generating activities that will inevitably be executed are: preparation and opening of rights-of-way (the development of site facilities including the workers’ camp and equipment depots, opening and working of quarries; construction of access roads, vehicle and truck traffic to transport workers and construction materials; excavation works for installation of structures; recruitment and presence of workers/labour, etc.).

The main significant impacts identified relate to the loss of vegetation, cropland, structural change and soil pollution by solid and liquid waste from construction sites, quarries and borrow areas. There are also risks of soil pollution due to potential oil spills, storage of equipment for the
construction of the bridge access roads and possible abandonment of organic or inorganic waste, as well as the alteration of air quality. An increase in turbidity and pollution of water resources arising from the construction works should also be expected.

However, given that wildlife is rare in the area covered by the works, the impact on wildlife related to the presence of the site will be of low intensity, local scope and short-lived, and therefore of minor importance overall.

On the human side, these impacts will result in the loss of employment for ferry employees and some hundred small informal traders following the disappearance of ferry activity. There are also expected to be negative impacts on health and safety due to risks related to accidents and injuries, respiratory diseases, diseases caused by the use of products (additives) and STI/HIV/AIDS.

Affected Population - Resettlement:

In the preparation/construction phase, the proposed construction of the bridge on River Niger at Farié will require the expropriation of agricultural land whose area is estimated at ……..

Project activities will impact 79 property owners with 21 croplands, 18 residential structures (6 plots and 12 homes), 29 commercial structures and 62 forest trees.

The number of people directly affected is estimated at 79, including 11 ferry workers. A brief resettlement plan was completed in June 2012.

The main positive impacts expected from the project operation phase may be summarized as follows:

- Opening up of the two banks of the river;
- Development and promotion of business activities;
- Economic development of the area concerned and the country in general;
- Easy access to markets, administrative, economic and health centres for all communities in the area concerned;
- Facilitation and reduction of passenger and goods transport costs;
- Improvement of the population’s health by facilitating medical evacuations;
- Improvement of financial resources for the communes concerned and the country in general; and
- Improvement and development of international trade.

Measures for mitigating the nuisance and enhancing the positive impacts of the project: To mitigate the various negative impacts of the project and enhance its positive impacts, a number of measures have been recommended to minimize or eliminate the impacts on the various components of the biophysical (soil, air, water resources, flora and fauna) and human environment (human health and safety, land and agriculture, income generating activities,
infrastructure, etc.). As part of the construction of the bridge on River Niger at Farié, an Environmental and Social Management Plan (ESMP) was proposed to mitigate negative impacts and enhance positive impacts related to development works and the presence of the bridge. The ESMP includes a brief plan for compensating the population affected by the construction and operation of the bridge. It consists in having project environmental commitments fulfilled. It will contribute to effectively strengthening the project's contribution to sustainable socioeconomic development of the beneficiary population. Thus, the ESMP is structured around an impact mitigation and limitation programme, an environmental inspection program, an environmental monitoring programme and a stakeholder capacity building programme.

6.3. The Ngouri-Bol-Daboua-Niger Border Road Section (331 km)

The implementation of this project will lead to negative environmental impacts, namely: (i) potential health impacts are mainly the risk of spreading HIV/AIDS in built-up areas crossed by the project; (ii) safety impacts are related to site management, the organization of the movement of vehicles, road traffic users, handling of explosives at quarry sites, etc.; (iii) deterioration of the landscape and the living environment by waste and scrap produced at the workers’ camp, soil erosion due to operation of equipment at quarry sites and borrow areas; (iv) risk of pollution of surface water and groundwater due to improper storage and/or poor handling of hydrocarbons when draining machinery; and (v) loss of regenerated vegetation, though limited, due to the right-of-way necessary for the proper management of works along the way. However, all these negative impacts are moderate, and mitigation measures have been provided to limit their scope.

Since the road and its right-of-way have existed for some twenty years, and throughout its layout there is no occupation of the right-of-way, the rehabilitation of this component of the project will not cause any population displacement or require compensation for affected property.

A number of mitigation measures should be put in place immediately the site is established (workers’ camp, hygiene and sanitation equipment, health facilities such as the infirmary and its equipment, etc.). Other measures such as safety precautions at sites, accident prevention measures in quarries, deviation signs, watering of deviation tracks and material transport tracks should be continuously monitored. This also applies to consultation with stakeholders, especially the local population regarding the location of quarries, reforestation, the use of local labour, etc. The following measures are planned for the implementation of the ESMP: (i) consultations with the inhabitants of neighbouring villages along the track for IEC activities on road safety, HIV/AIDS control and reforestation works (planting of compensatory vegetation and alignment trees). These consultations will be organized by NGOs providing specialized services; (ii) for quarry site and borrow area rehabilitation or development works, consultations will be held between the company, the control mission, the Environment and Road Safety Unit, decentralized State services and representatives of the communities involved to determine the appropriate type of operation (water plan rehabilitation or development) and the precautions to be taken within the context of the project.

Impacts on water resources: The works involve the utilization of amounts of water, which in this case will be abstracted from the lake, ponds or boreholes (which will be drilled for this purpose), in competition with the needs of the residents and/or livestock.
Significant abstraction of surface water may also result in the deterioration of water quality: (a) increased water turbidity arising from the reduced dilution capacity and the re-suspension of sediments caused by the trucks; and (b) increase in overall water temperature brought about by falling water volumes, which implies a decrease in oxygen content. This may cause loss of micro-organisms and other organisms living in these environments. Runoff water may also carry pollutants left on the road or on the spot by machinery (oil, diesel). When the quantities carried down to a pool are substantial, these products will cause the deterioration of water quality, leading to pollution.

**Impacts on groundwater:** The polluted surface water could contaminate groundwater by infiltration. This impact is negligible in light of the likely quantity of surface water that will be polluted. Due to the lack of water for works on certain road sections, water needed for construction will be abstracted from boreholes and wells. These facilities usually reserved for human use are in most cases insufficient in number to meet the needs of the population, as evidenced by the long lines of women found around wells in some villages. To address the water needs for the works, the company will be forced to drill boreholes, which after the works will revert to the local people who will determine their use and organization. Improper and uncontrolled use of well water may lower the water table. However, the risk of groundwater pollution by oil and fuel will be low.

**Impacts on vegetation:** the effects of road construction activities on vegetation will be observed mainly at three levels: crop fields, remains of lowlands woody vegetation and spontaneous vegetation that has colonized the road shoulders over time.

**Crop fields:** It will be necessary to open tracks to have access to quarries and ponds where they do not already exist. The opening or reopening of these tracks will lead to the destruction of vegetation along the entire length of the track and probably in the surrounding area through vehicle movements. Since tree density is very low (or negligible) in these areas, trees will be avoided, as necessary, to minimize the number to be felled (in the first section, flood zones and built-up areas, which are more wooded in the study area). The destruction of these plants will be limited largely to grass and a few shrubs with little ecological value. Upon completion of the works, these areas will be quickly recolonized by annual species. At this point, the impact on plants will be negative but mild and transient (limited to the road construction phase).

**Woody vegetation of the lowlands:** The quarries maintained in this project are old ones accessible by existing tracks, although the latter are in a state of total degradation. The recovery of these tracks will require clearing the shrubs that have colonized them in some places. The road construction will not cause any significant increase in pressure on the woody vegetation of the lowlands. However, new operators and new wood sale points may be expected in the area because of better transport conditions that will prevail. The negative impact of the project on the woody vegetation lowlands would be of low intensity and reversible.

**Spontaneous vegetation on road shoulders:** Significant spontaneous vegetation composed mainly of *Balanites aegyptiaca* and *Boscia senegalensis* combined with *Caloptropis procera* and *Leptadenia pyrotechnica* has formed along the first 18 km of the road, thanks to the very favourable P3F\(^1\)P irrigation conditions. It will be necessary to clear this spontaneous vegetation.

\(^1\) The irrigation results from road drainage ditch waters which, with time, have been formed from runoff.
However, this will not result in significant ecological imbalance, due to the relatively low density of vegetation in these areas and the fact that the species present have a high regeneration capacity. The wood resulting from this operation will be made available to the neighbouring population.

**Impacts on wildlife and domestic animals:** The project area is poor in game. However, the spontaneous vegetation found on site has created conditions that attract small rodents which have begun living therein. The traffic caused by the works will lead to their displacement. Since the works period is not long, the cutting effect of the project on wildlife may be minimal. Oil spills (accidental or not) might possibly destroy the aquatic micro-fauna in the site where the water is abstracted (micro-depressions and small ponds). The road works will change the slope with the increase of the embankment at the crossing of passage corridors used by domestic animals. This will make road crossing difficult for animals, especially cattle, which may suffer falling.

**Impacts on the human environment**

**Impacts on the health and well-being of the population:** An increase in dust concentration will be felt in built-up areas crossed. There is a danger of lung disease not only for local residents but also for site workers. The negative impact of the project is considered low and will be temporary and localized. Protective measures must be taken to minimize the inconveniences that will be caused to the population. The road layout exactly matches the existing path in some sections. As such, no public or social facility will be affected. Stalls will be temporarily displaced in the major built-up area crossed. This is an inconvenience for the residents, especially roadside vendors. The negative impact will thus be small and temporary. However, there is a danger of accidents during the works in all the built-up areas crossed.

The management of waste generated by the project in the base camps and garages may affect the quality of life of the population. Such waste varies from fuel and lubricant discharges to cans discarded by workers. The improper management of this waste may have an immediate impact on the population’s health. Some of these consequences are: the possible pollution of water sources by the transport and discharge of waste in ponds or by infiltration in wells, the consumption of expired food remains or the use of discarded cans by children. The negative impact in this regard will be minimal if appropriate measures are taken to address the risks.

However, the co-habitation of project staff with the local population may lead to a change in the traditional lifestyle of the latter. The presence of workers in villages raises fears of the transmission of sexually transmitted infections (STI/AIDS). However, raising proper awareness among the workers and the population could help avert the negative effects of the project. Over and above these negative impacts of the project, it should be noted that the presence of the project in the area and the use of the road thus rebuilt will have strong and multifaceted positive impacts on the local communities and the country at large. This is discussed in the next paragraph.

The ESMP combines the implementation of the impact-mitigation measures identified and the environmental surveillance and monitoring plan. The ESMP sets out the goals, outcomes, activities, implementation period, stakeholders involved, objectively verifiable indicators, means of verification of these indicators and the order of priorities.
Measures to mitigate potential impacts on water resources

To prevent water pollution by waste oil drained from earthmoving equipment, the terms of reference must impose the collection of such waste oil for recycling. Indeed, the oil may be reused by the population (to combat timber pests, plastering of houses, etc.).

Special attention will be given to water abstraction stations. Indeed, the motor pumps must be in good working condition to prevent leakage of diesel and oil that could pollute water meant for human and animal consumption. These motor pumps will be situated at a distance of at least 30 meters from the abstraction site (in the case of abstraction from surface water or rivers) and will be arranged on a platform (bund) where hydrocarbon spills can be contained.

In addition, water intended for works will not be abstracted in villages where supplies are still inadequate. To avoid conflicts over water use, boreholes will be drilled all along the road. Efforts will be made to ensure that these boreholes are situated as close as possible to each built-up area crossed. At the end of the works, these boreholes may be fitted with manual or solar (electric) pumps for usage to be determined by the people (DWS, gardening, etc.).

Measures to mitigate potential impacts on vegetation: Trees found on the right-of-way will be pre-marked with paint prior to the commencement of excavation works. This approach could prevent additional felling of trees beyond the set limit. Felled trees will be compensated for by planting alignment trees along the road on both sides and those at the crossing of built-up areas. These alignment trees shall mark the entry and exit of built-up areas over a distance of two (2) kilometres on either side of the built-up areas and shall be the responsibility of the road construction company. Moreover, village groves shall be created to compensate for felled trees. For the construction of temporary tracks leading to the material deposits, the same stringency shall prevail (prior marking of trees and replacement with other plant species). Deviations will be limited strictly to the shoulders where this solution does not involve the risk of accident. This method will prevent any significant destruction of vegetation. The tracks will be built after the clearing of the right-of-way. Wood cleared from the road will be used as firewood. However, it is recommended that this activity be strictly monitored by the local service in charge of water and forests to prevent abuse. The service will first raise the population’s awareness to the fact that the project is a one-off and exceptional activity, which will end when the works are over. In addition, due to limited firewood resources, it will educate people on the use of cost-effective cooking techniques such as improved stoves.

Measures to mitigate potential impacts on wildlife:

- Prohibition to harvest wildlife (by hunting and other means);
- Prohibition to transport game meat (“bush meat”) in construction vehicles and machinery;
- Installation of vertical signs indicating areas crossed by wildlife; and
- Intensification of anti-poaching by the local authority in charge of wildlife protection.

To this end, the local service should be reinforced with material and human resources.
The ESMP has no plan for the displacement of or compensation for the population insofar as this project component does not foster this problem.

**Project cumulative impacts**

By definition, a project’s cumulative impacts include impacts on areas and resources resulting from the proposed project, in addition to the impacts of other projects, whether these are ongoing or planned. Cumulative impacts also include impacts resulting from activities of associated facilities, regardless of the entity undertaking these actions. Cumulative impacts can result from minor individual action to significant collective actions and can take place over an important period of time.

Overall, the cumulative impacts of the trans-Saharan project are positive and benefit the population in the area of influence. Expected impacts are of an economic, social and security nature. Although the impacts of earthworks in Niger are minor, the first segment of the Chadian section will require clearing spontaneous bush of low ecological value. The cumulative impacts of the use of water resources may be significant and require measures to ensure the efficient rationalize the use of water resources (surface and ground water resources).

**Environmental and Social Management Plan**

The Environmental and Social Management Plan aims at taking into account environmental and social concerns in the construction and operating phases of the project.

The ESMP includes:

- Activities designed to mitigate negative impacts and enhance positive impacts;
- A monitoring program;
- A program designed to enhance capacity building, and conduct awareness activities and other complementary initiatives;
- A division of responsibilities and schedule of implementation as well as related costs.

General health and safety measures and good practices as well as site specific mitigation measures and / or compensation of fauna and flora have been proposed in the project section.

The ESMP includes health awareness activities (STIs and AIDS) and road safety. Educating the public on road safety will be made by NGOs or relevant structures.

In addition, the ESMP plans for capacity building activities related to environmental monitoring benefiting local technical services.

The cost for the overall environmental and social measures relating to the multinational Transaharan Highway Project stands at CFA Francs 11.28 billion. Ancillary works and sand dunes fixation represent the major part of this cost detailed as follows:
<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Total cost in CFA Franc</th>
<th>Responsibility for implementation</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Ngouri/Bol/Daboua/ Niger-Chad border Section</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Fixation of sand dunes</td>
<td>2,593,000,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
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<tr>
<td>2</td>
<td>Paving with steppe black or clay soil</td>
<td>750,000,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
</tr>
<tr>
<td>3</td>
<td>Brick facing</td>
<td>280,000,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
</tr>
<tr>
<td>4</td>
<td>Bank vegetation</td>
<td>250,000,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
</tr>
<tr>
<td>5</td>
<td>Planting of forest species (gum tress)</td>
<td>75,000,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
</tr>
<tr>
<td>6</td>
<td>Planting of shrub species</td>
<td>240,000,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
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<tr>
<td>7</td>
<td>Alignment planting and landscaping</td>
<td>60,000,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
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<tr>
<td>8</td>
<td>Awareness campaigns on road safety, environment and HIV/AIDS</td>
<td>175,000,000</td>
<td>NGO</td>
<td>Before the works</td>
</tr>
<tr>
<td>9</td>
<td>Ancillary works</td>
<td>4,352,250,000</td>
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<td>During the works</td>
</tr>
<tr>
<td></td>
<td><strong>Sub-Total</strong></td>
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<td></td>
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<tr>
<td></td>
<td><strong>Arlit/Assamakka Section</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Alignment planting</td>
<td>165,000,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
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<td>2</td>
<td>Fixation of sand dunes</td>
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</tr>
<tr>
<td>3</td>
<td>Environmental follow-up</td>
<td>135,000,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
</tr>
<tr>
<td>4</td>
<td>Awareness campaigns on road safety, environment and HIV/AIDS</td>
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<td>NGO</td>
<td>Before the works</td>
</tr>
<tr>
<td>5</td>
<td>Ancillary works</td>
<td>1,254,750,000</td>
<td>Contractor/Supervisor</td>
<td>During the works</td>
</tr>
<tr>
<td></td>
<td><strong>Sub-Total</strong></td>
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<td></td>
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<tr>
<td></td>
<td><strong>Farie Bridge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Compensation of affected people</td>
<td>399,000,000</td>
<td>Administration</td>
<td>Before the works</td>
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<td>Awareness campaigns on road safety, environment and HIV/AIDS</td>
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<td>3</td>
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<td>Contractor/Supervisor</td>
<td>During the works</td>
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<td></td>
<td><strong>Sub-Total</strong></td>
<td><strong>728,000,000</strong></td>
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<td></td>
<td><strong>Grand Total</strong></td>
<td><strong>11,275,000,000</strong></td>
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</tr>
</tbody>
</table>

7 Environmental Risk Management

The project risks mainly relate to the working of quarries, construction works, storage of pollutants and traffic accidents. Monitoring and mitigation measures are provided for by the project:
**Barriers to movement:** The contractor will at all times maintain traffic flow and access for local residents to their homes, farms and places of economic activity during works.

**Fuel, lubricants and hydrocarbons depots:** Fuel, lubricants and hydrocarbons depots as well as facilities for the maintenance of the company’s equipment must comply with the requirements for these types of facilities. These facilities should be located over 500 m away from watercourses; where appropriate, precautions should be taken to waterproof the site and to contain the facilities in a residual space to prevent the flow of products to surface water.

**Safety instructions:** (1) measures will also be taken to ensure the safety of local residents: sites will be marked and identified by signposts in quarry areas and access strictly forbidden to visitors; (2) in built-up areas, barriers will be erected to prevent the public and unauthorized persons from entering worksites; (3) worker safety arrangements will be made, including: wearing of dust masks, gloves and safety footwear; (4) speed limit measures in the two built-up areas will be taken; and (5) the workers’ camp and the parking area will be lit at night.

**Noise-related instructions:** The company working in residential areas will as much as possible, avoid noise during the hours of rest, especially at night. To this end, the company will comply with the instructions relating to the adjustment of machinery, etc.

**Security risk:** Owing to developments in northern Mali and the insecurity in Libya, the Agadez region has become an endemic insecurity area, despite the tireless efforts of the authorities to maintain a secure environment enabling the implementation of major projects in northern Niger. In this regard, there is need for vigilance and precautions should be taken in advance because the project may be compromised by the least insecurity.

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8 **Surveillance and Monitoring Programme**

8.1. **The Arlit-Assamaka Road Section in Niger**

An environmental surveillance programme is intended to ensure that all commitments and obligations, including environmental mitigation measures, are applied during the works.

The implementation of this surveillance programme will require the mobilization of several stakeholders, prominent among which are the General Directorate of Major Works (DGGT) and the Environmental and Impact Assessment Bureau (BEEEI). Concerning the latter, the surveillance activities will consist primarily in carrying out control missions on the ground before and during the construction phase.

It helps to maintain the negative environmental impacts of the project at a low or acceptable level, and to ensure environmental protection. This environmental surveillance programme includes, in particular: (a) a list of elements or parameters requiring environmental surveillance; (b) all the measures and means envisaged for environmental protection; and (c) the obligations of project owners and contractors regarding the submission of surveillance reports (number, frequency and contents).
The surveillance mechanism will be based on the full participation of the Agadez and Arlit Regional Directorates responsible for the Environment, supported by their counterparts responsible for Health, Social Development and Community Development. This will allow for closer monitoring of the implementation of the environmental clauses and ESMP terms. Thus, the team, supported by the consulting firm responsible for project supervision, will develop a timeline on the project duration to ensure compliance with the measures contained in the technical dossier and the environmental impact assessment report. The BEEEI will organize periodic missions to ascertain compliance with implementation measures.

Environmental monitoring programme: Monitoring concerns all observation activities and measures aimed at determining the real impacts of project achievements compared to the impact projections made during the environmental assessment. The environmental monitoring will make it possible to acquire data, correct mitigation measures and possibly revise certain environmental protection standards useful in the development of new asphalted road projects.

The data collected during the environmental monitoring exercise will be used to correct the mitigation measures and possibly revise certain environmental protection standards. The monitoring programme describes: (a) the environmental components to monitor; (b) actions to be carried out; (c) monitoring indicators; (d) responsibilities in terms of implementation; (e) monitoring frequency; and (f) the costs of the exercise.

The programme will run throughout the duration of the project and will be under the responsibility of BEEEI and DGGT, in accordance with the provisions of Decree No. 2000-397/PRN/ME/LCD relating to the administrative procedure for assessment and review of environmental impacts that could be supported by technical ministries through their decentralized services. Monitoring will focus on water, health and safety, that is to say, on biophysical and human components, whose impact assessment outcome pointed to a critical need in terms of the social repercussions and degree of disturbance of the component in question.

8.2. Farié Bridge on River Niger

Environmental surveillance consists in ensuring that the project’s environmental commitments are honoured. It aims to ensure the effective implementation of the various measures proposed to mitigate or strengthen, as the case may be, the impacts resulting from the project implementation and in compliance with legal provisions in force in Niger. The implementation of the surveillance programme will require the mobilization of several stakeholders, including the Environmental and Impact Assessment Bureau (BEEEI), the beneficiary population and the enterprise awarded the works contract. The environmental surveillance programme is detailed in the ESIA report.

8.3. The Ngouri-Bol-Daboua-Niger Border Road Section (330 km)

Environmental Surveillance Programme: Surveillance is intended to ensure that mitigation and enhancement measures proposed in the previous section are effectively implemented in each of the successive project phases and that the applicable regulations are complied with. The Highways Department, acting through the Environmental Unit, shall be responsible for the surveillance of the environmental aspects of works. It shall be assisted by the representative of the Ministry of Environment in the project area.
Surveillance primarily involves the participation of a select Technical Committee comprising, among others, the environmental expertise or social expert responsible for ascertaining the implementation of the proposed measures and compliance with regulations. The Technical Committee shall have the power to change the working schedule or methods for the purpose of achieving protection of the natural and human environments. It goes without saying that it must have legal status. This Committee shall operate in accordance with Decree No. 2010 630/PR/PM/MEERH/2010 of 4 August regulating environmental impact assessment. The Technical Committee shall also act as coordinator and consulting engineer as some measures may require environmental expertise prior to implementation by any of the project stakeholders, including the government, contractor, MDC and the beneficiaries.

To perform its functions as controller, consultant and coordinator, the Technical Committee will use such tools as: this environmental impact assessment report (EIAR), detailed plans of the Massakory-Bol-Niger Border road to be constructed and the regulations in force as well as any documents it deems necessary for the fulfilment of its tasks. The Technical Committee will submit a monthly report outlining its activities and the implementation of mitigation and enhancement measures. This report will mention any environmental problem that occurred during the reporting period. Surveillance measures will focus on a number of components at different phases of the project.

“Site Installation” Phase

- Approve the installation plan (drain pan, dumps, storage areas, etc.)
- Inspect workers’ camp (latrine, infirmary, dumps, etc.).

“Works Implementation” Phase

- Control in relation to the intervention plan and technical specifications in accordance with the worksite process (site log, etc.);
- Verify materials, areas actually affected, quantities implementation;
- Verify the most important points made in the ESMP (environmental and social measures, indicators);
- Include an “environmental measures” item during site meetings with enterprises;
- Prepare either an environmental report or record;
- Take environmental measures into account during works acceptance.

“Works completion” Phase

- Verify the rehabilitation of borrow pits and quarry sites, the filling of pits, removal of provisional excavated and backfill material, removal of hulks and other debris, and general clean-up of worksite;
- Prepare a works completion report;
- Conduct an end-of-mission assessment of the activities carried out and gauge the effectiveness of the measures and methods used on the worksite to:
• Prevent the temporary adverse impact of the works and propose a methodological framework applicable to similar works sites (feedback).

The Contractor will establish a quality assurance plan (QAP), which will also incorporate environmental compensation measures. The implementation of the QAP will be supervised by the mission control and supervision. The executing agencies housed in the Ministry of Infrastructure (Chad) and the Ministry of Infrastructure (Niger) will be responsible for an additional verification of the implementation of the ESMP, through their supervision missions. A complaints log register will be kept in each executing agency and in the CLRT. Each institution shall establish a log for the time of the complaint and share this information with other agencies. The mechanism for handling complaints will be determined during the negotiations financing

9 Public Consultations and Information Dissemination

9.1. The Arlit-Assamaka Road Section in Niger

The field study concerned the right-of-way area and its environment. It was supplemented by surveys of local authorities and environmental services in Arlit, as well as a literature review (previous work) on the project impact area in question.

Local administrative and traditional authorities were finally met to hear their opinions and expectations about the work. Meetings with the heads of regional and district technical services also enabled the collection of the necessary data on the project area. Communities have been consulted since the beginning of the first studies in 2007. They were subsequently consulted during the process of updating the studies, which took place in April 2013. In addition, the Bank mission met with representatives from the communities, national authorities and NGOs during the preparation and appraisal missions that took place in February and June 2013, respectively.

9.2. Farié Bridge on River Niger

The preparation of a road project requires public consultation at the design phase to optimize the route selection and ensure the acceptability of the road infrastructure in the beneficiary environment. For this study, the environmental team conducted a field mission from 13 to 16 October 2011 in the project area. The purpose of this mission was to brief the various stakeholders, particularly the population, elected officials and customary and administrative authorities on the progress of the feasibility study under which the environmental and socioeconomic impact assessment was being conducted for the construction of a bridge on River Niger at Farié and, in return, hear opinions and expectations regarding this project.

The mission met with the executives of the Regional Directorate of the Environment and the Prefect of Tillabéri, the Mayor and local officials of Kourtheye Rural Commune, divisional officials in charge of the environment and land, maritime and river transport in Téra, the Prefect
of Téra, the Head of Gothêye Administration Post, the Mayor and local officials of Gothêye Rural Commune, the population of Saya Tallé and Farié Gourma villages (Gothêye Rural Commune) Bagoumé and Farié Hausa (Kourthèye Rural Commune).

The administrative authorities and especially the mayors and local elected officials were very insistent on the issue of career management in decentralized communities and the involvement of communes in the recruitment of local labour, given the experiences in the exploitation of mining careers in the Arlit area account. In this project, the massive rock quarries will be exploited in accordance with national legislation. Companies will have to obtain all required licenses before starting quarrying. They will also develop a security plan which will highlight all the security measures put in place.

The participation of the population in the planning and implementation of Resettlement Plan Summary is paramount. In this regard, the public consultation was carried out throughout the study period. In October 2011, consultations, socioeconomic surveys of the household census and meetings with the Téra Conciliation Commission were conducted. These initiatives afforded the stakeholders an opportunity to reflect on ways to scrupulously adhere to the various stages from consultation, start-up of studies to the implementation of the Resettlement Plan Summary.

Decentralized administrative authorities have also conducted a site visit in May 2013, to reassure people about the imminent start of the work. Moreover, the Bank conducted a field visit during appraisal in June 2013, with the consultant and Administration. This visit resulted in participatory meetings with people in villages near the work site. The discussions helped to define related to realize improvements.

9.3. The Bol-Daboua-Niger Border Road Section (330 km)

In this study, the environmental team conducted a field mission from 14 to 23 May 2011 in the project area. The purpose of the mission was to brief the various stakeholders, particularly the population, elected officials and customary and administrative authorities on the status of the study, including the assessment of the environmental and socioeconomic impact of the Project and, in return, to hear their opinions and expectations regarding the project. Meetings were held in Ngouri, Bol, Liwa, Rig-Rig and Massakory.

This summary will be posted on the website of the Bank 120 days before the presentation of the project to the Board of Directors.

10 Complementary Initiatives

10.1. The Assamaka-Arlit Road Section in Niger

The project provides for the drilling of four boreholes at 50 km intervals along the road. These boreholes will help to improve the availability of water along the stretch for road users who previously had only two water points - one in Arlit and the other in Assamaka. The project also includes the construction of two docks designed to load and unload livestock. The total costs related to these facilities amounted to 1.25 billion FCFA.
The project also provides for a road safety and HIV/AIDS communication programme as well as a capacity building programme comprising a workshop on environmental monitoring to support local technical services.

10.2. Farié Bridge on River Niger

In addition to a road safety and quarry exploitation communication programme, the project includes the following complementary initiatives: the rehabilitation of two schools, a health center, the construction of a market and two boreholes managed by solar water pump. The costs of these related facilities amounted to 242 million

10.3. The Ngouri-Bol-Daboua-Niger Border Road Section (330 km)

The project plans to raise awareness about health, STIs and AIDS. Educating the public on road safety will devolve on NGOs or relevant structures. These awareness campaigns will be conducted by NGOs, preferably local. The project includes complementary activities designed to improve the living conditions of the affected communities. These activities are: the rehabilitation of 100 km of rural roads to open up areas of agricultural output and weekly markets, the rehabilitation of three schools and three health facilities, the building of 15 docks and unloading animals, the construction of 20 wells managed with solar water pump. The estimated costs of the initiatives amount to FCFA 4.35 billion FCFA

11 Conclusion

The construction of the Trans-Sahara Highway is a project of national importance in that it contributes to the opening up of Niger and Chad. It promotes socioeconomic development through the opportunities it offers in terms of the marketing of agro-pastoral products, ease of transportation of goods between the port of Algiers and the northern part of the country, the comfort of travelling and medical evacuations.

However, the road is not without negative impact on the physical environment and the lifestyle of the local population. The main negative impact is the moral depravity that could result from the contact between this population and an ever-growing number of travellers from diverse backgrounds. The permanent contact between natives and non-natives could also foster the spread of STIs/HIV/AIDS.

The integration of environmental considerations into the planning, design and construction of road projects is necessary to maximize the benefits for the population and reduce the negative impacts for generations to come. The project evaluation will be facilitated by surveillance and the environmental and social monitoring of the actual short- and medium-term impacts of operating the road.
Moreover, during its construction and operation, the Farié Bridge will generate obvious positive impacts for the benefit of the population of the area and the country at large. It will foster sub-regional integration by promoting trade. The expected positive economic, social and security impacts are considerable. The project will also have a negative impact on components of the biophysical and human environment highlighted by this study. The effect of works-related earthworks on the vegetation cover will be negligible. A compensation and redeployment scheme will be put in place for ferry workers whose activities will decline as a result of the project.

12 References and Contacts

In drafting this summary, the following documents were consulted

- ESIA of the Arlit-Assamaka road (border of Algeria), June 2013;
- ESIA of the Farié Bridge on River Niger, March 2012;
- Resettlement Plan Summary for the Farié Bridge on River Niger, June 2012;
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